1943

Forty-Fourth and Forty-Fifth Annual Reports of the Commission of Fisheries of Virginia

Commission of Fisheries of Virginia

Forty-Fourth and Forty-Fifth Annual Reports

OF THE

COMMISSION OF FISHERIES OF VIRGINIA

FOR THE

FISCAL YEARS ENDING JUNE 30, 1942 and JUNE 30, 1943

RICHMOND:
DIVISION OF PURCHASE AND PRINTING
1943

OYSTER TONG BOATS IN THE JAMES RIVER

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COMMISSION OF FISHERIES OF VIRGINIA

FOR THE

FISCAL YEARS ENDING JUNE 30, 1942 and JUNE 30, 1943

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1943

COMMISSION OF FISHERIES

CHARLES M. LANKFORD, JR., *Commissioner*.....Franktown, Va.

ASSOCIATE MEMBERS

GEORGE W. LAYMAN.....New Castle, Va.
CHARLES E. STUART.....Montross, Va.
R. A. EDWARDS.....Isle of Wight, Va.
PAUL CROCKETT.....Yorktown, Va.

OFFICE

WILBUR F. YARRINGTON, *Chief Clerk*.....Newport News, Va.
LENA S. COSBY, *Assistant Chief Clerk*.....Newport News, Va.
ELIZABETH M. CORSON, *Senior Account Stenographer*.....Newport News, Va.
STELLA TURLINGTON, *Secretary to Commissioner*.....Exmore, Va.

ADMINISTRATION

GEORGE H. BADGER, *Civil Engineer*.....Newport News, Va.
L. SELDEN TAYLOR, *Superintendent of Inspectors, Police and Boats*.....Norfolk, Va.
J. T. MEYER, *Superintendent of Hatcheries*.....Richmond, Va.

FLOYD E. KELLAM, *Attorney*.....Norfolk, Va.

GENERAL OFFICE OF COMMISSION—NEWPORT NEWS, VA.

VIRGINIA FISHERIES LABORATORY
YORKTOWN, VA.

CURTIS L. NEWCOMBE, *Biologist and Director*.....Williamsburg, Va.
GEORGE M. MOORE, *Associate Biologist*.....Williamsburg, Va.
HUBERT J. DAVIS, *Assistant Biologist*.....Williamsburg, Va.
R. WINSTON MENZEL, *Assistant Biologist*.....Yorktown, Va.

OYSTER INSPECTORS AND DISTRICTS

NAME	ADDRESS	DISTRICT	COUNTIES
R. H. Beale	Hague, Va.	Dist. No. 1 Dist. No. 2	Westmoreland, Northumberland, King George, Prince William, Stafford and Fairfax.
E. O. Corsa	Fleeton, Va.	Dist. No. 4	Northumberland.
W. N. Gresham	Kilmarnock, Va.	Dist. No. 5	Northumberland and Lancaster.
J. E. Blakemore	Ottoman, Va.	Dist. No. 6	Lancaster.
*John Curlett	Bowlers Wharf, Va.	Dist. No. 7	Richmond, Essex and Caroline.
Otis Thomas	Severn, Va.	Dist. No. 8	Gloucester.
M. H. Hogg	Wicomico, Va.	Dist. No. 9	Gloucester, King and Queen, and King William.
Geo. E. Brooks	Onemo, Va.	Dist. No. 10	Mathews.
*J V. Shipley	Cobbs Creek, Va.	Dist. No. 11	Mathews and Middlesex.
R. L. Jones	Saluda, Va.	Dist. No. 12 Dist. No. 14	Middlesex.
L M. Callis	Seaford, Va.	Dist. No. 15 Dist. No. 16	York, James City and New Kent.
*J. F. Lewis	Cobbs Creek, Va.	Dist. No. 17	Elizabeth City.
Frank Garrow	Denbigh, Va.	Dist. No. 18	Warwick and James City.
*P. T. Martin	Rescue, Va.	Dist. No. 19	Isle of Wight and Surry.
†J. T. Meyer	Richmond, Va.	Dist. No. 19-A	Chesterfield, Henrico, Prince George, Charles City, King William and New Kent.
J. B. Bush	Eclipse, Va.	Dist. No. 20	Nansemond.
C. C. Absalom	Norfolk, Va.	Dist. No. 21 Dist. No. 22	Norfolk and Princess Anne.
J. C. Bell	Nassawadox, Va.	Dist. No. 24	Accomack and Northampton.
John G. Mears	Willis Wharf, Va.	Dist. No. 25	Northampton.
Herman Onley	Sanford, Va.	Dist. No. 26	Accomack.
W. D. Steelman	Chincoteague, Va.	Dist. No. 28	Accomack.
*A. C. Johnson	Wachapreague, Va.	Dist. No. 29	Accomack.

*Also listed under Police Boat Captains.
†Also listed under Administration.

DEPUTY INSPECTORS AND DISTRICTS

NAME	ADDRESS	DISTRICT	COUNTIES
W. B. Marchant	Colonial Beach, Va.	Dist. No. 1 Dist. No. 2	Westmoreland, Northumberland, King George, Prince William Stafford and Fairfax.
H. C. Doggett	Monaskon, Va.	Dist. No. 6	Lancaster.
H. C. Ellis	Greenbackville, Va.	Dist. No. 28	Accomack.
W. N. Steelman	Chincoteague, Va.	Dist. No. 28	Accomack.

POLICE BOATS, POLICE CAPTAINS AND ENGINEERS

NAME OF BOAT	CAPTAIN	ENGINEER	ADDRESS
"Will F. Kellam"	W. C. Allen		Onancock, Va.
"Katie"	Julian F. Lewis		Cobbs Creek, Va.
"Agnes Hope"	J. A. Maddox	E. G. Parks	Tangier, Va.
"Inquirer"	H. B. Miller	L. T. Kilmon	Hampton, Va.
"Victor"	W. S. James		Exmore, Va.
"Charmian"	J. V. Shipley	Wm. E. Wise	Colonial Beach, Va.
"The Crab"	P. T. Martin		Weems, Va.
"Cull Boy"	John Curlett		Irvington, Va.
"Willissett"	A. C. Johnson		Cobbs Creek, Va.
"C F. 12 Jane"	*J. T. Meyer		Rescue, Va.
"Machipongo"	W. H. Crockett		Bowlers Wharf, Va.
		Bruce Mears	Wachapreague, Va.
			Richmond, Va.
			Willis Wharf, Va.
			Willis Wharf, Va.

*Also listed under Administration and Oyster Inspectors.

REPORT OF COMMISSIONER OF FISHERIES

COMMONWEALTH OF VIRGINIA,
COMMISSION OF FISHERIES,
NEWPORT NEWS, VIRGINIA, *November 15, 1943.*

To His Excellency, HONORABLE COLGATE W. DARDEN, JR.,
Governor of Virginia
and
THE GENERAL ASSEMBLY OF VIRGINIA:

In accordance with Section 3146 (15) of the Code of Virginia, 1942, requiring the Commission of Fisheries to make an annual report to the Governor and a report to the General Assembly at each regular session, we submit herewith the following report of the Commission of Fisheries of Virginia for the two fiscal years ending June 30, 1942, and June 30, 1943, respectively.

On the first pages of this report there are listed the names and addresses of the present members and employees of the Commission.

The Statute above referred to requires that this report show plainly the amounts of revenue derived from the fish and shellfish industries under the supervision of the Commission, and also the expenditures of said Commission; together with a discussion of the fish and shellfish industries under the supervision of the Commission. There is on record in the office of the Commission at Newport News a detailed comparative statement setting out all receipts and disbursements of the Commission of Fisheries for the fiscal years ending June 30, 1942, and June 30, 1943, respectively, but for the sake of economy said detailed statement is not made a part hereof.

There are filed herewith, however, the following tables setting out data indicated in the titles thereof for the fiscal years referred to, as follows:

1. Receipts from Fish and Oyster Industries by Districts.
2. General Fund, Receipts and Expenditures.
3. Oyster Repletion Fund, Receipts and Expenditures.
4. List of Recorded Planting Ground.
5. Color and Age of Tongers Licensed.
6. Comparative Statement of Expenses by Years from 1924 to 1943, Inclusive.

There are also filed herewith the following exhibits:

Exhibit A. Report of J. T. Meyer, Superintendent of Hatcheries.
Exhibit B. Report of Dr. Curtis L. Newcombe, Director of Virginia Fisheries Laboratory.
Exhibit C. Report of Captain L. Selden Taylor, Superintendent of Boats, Inspectors, and Conservation.

The tables and exhibits above referred to are self-explanatory, and clearly indicate the improved condition of the financial affairs of the Commission. This improvement was not accomplished at the expense of the individual employees of the Commission by a reduction in salaries paid, but we have been able to effect certain economies in operating expenses and also we have consolidated districts where possible in order to increase efficiency and reduce the number of employees in several instances. As a matter of fact, the general wage scale of the Commission employees has been substantially increased as compensation paid during the past several years seemed extremely low. Further, we have recommended

additional increases in salaries and we were able to show the justification for such requests, and at the same time our tentative budget for the next biennium shows a decrease under that of the present biennium.

Hereinafter, we discuss the condition of the fish and shellfish industries under the supervision of the Commission and certain matters pertaining thereto.

STATE BOATS

Due to natural depreciation and the sale of two boats, most of the floating equipment of the Commission is in urgent need of replacement. A minimum of three additional patrol boats are needed for present work, and this need will increase after the present emergency. Another boat is needed at once for enforcement work in the Potomac River area, where enforcement has always been a difficult problem. Violations of the oyster laws there have been numerous, but with present equipment it is virtually impossible to properly patrol the Potomac River. A boat is needed for Chesapeake Bay patrol work, and a third boat is needed in the rivers adjacent to the Bay.

It is difficult to purchase boats at reasonable prices at this time, but we expect to be able to do so immediately after the present emergency has ended.

OYSTERS

During the past two fiscal years the oyster planters and tongers have enjoyed unprecedented prosperity. The supply of seed oysters in the James River area, which is apparently the outstanding seed oyster area in the world, has been plentiful, and the price received therefor has been higher than in the memory of any person connected with the Commission. In spite of the unusually high wages prevailing in Tidewater Virginia the number of licenses issued for tongers to work on public oyster and clam ground has remained about the same.

There has been an extension in oyster planting, as is shown by the fact that the amount of acreage of leased ground increased for the past fiscal year to the extent of approximately 1,000 acres over the previous fiscal year.

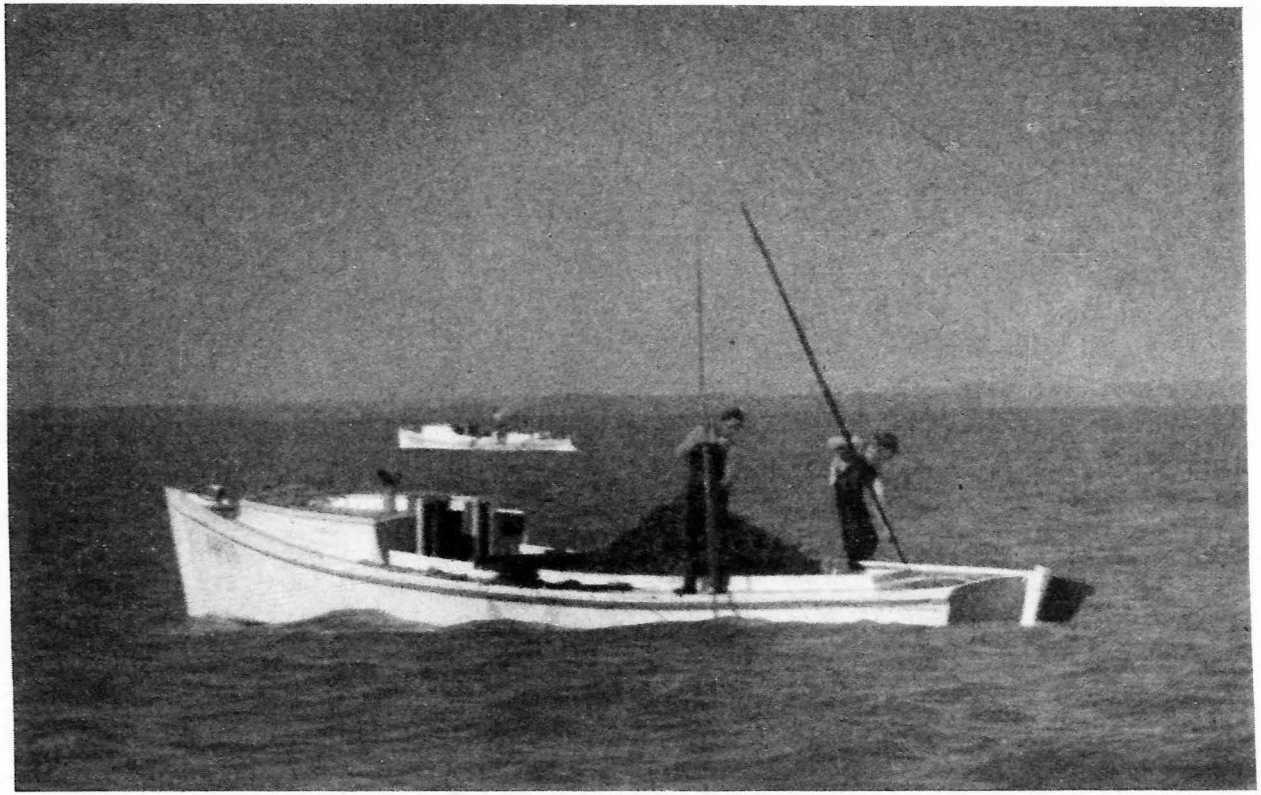
Due to the scarcity of labor and extremely high labor costs our program for repletion of the public rocks of the State has been substantially curtailed. However, we have plans for extensive repletion work immediately the present crisis is over, when we can obtain somewhere near value received for money to be expended. In fact, we shall probably purchase a small dredge boat to be used in experimental work and also for the purpose of transplanting shells and seed oysters from beds already established to ground suitable for transplantation and where the oysters will be of the most value and benefit to the general working public. This planting of shells in depleted areas and transplanting of seed oysters from planting grounds to good growing ground is in line with recommendations from the advisory representatives of the United States Fish and Wildlife Service, and is also practiced by the private oyster planters of the State. By encouraging private planters to extend their operations and lease additional planting ground and by an extensive repletion program we hope to be able to largely restore the great oyster industry of Virginia. Already we have obtained satisfactory and substantial results from the limited repletion work we have been able to do under difficulties existing during the past two fiscal years.

The oyster supply in the State has been reasonably good in spite of a very heavy demand. In sections of the State where the salinity of the water is highest, the screwborer, or oyster drill, continues to be a problem, but experiments are being conducted that we hope will help to curtail the damage done annually by this pest.

We would report that the oyster industry of the State as a whole is in a healthy condition.

CRABS

An increase in the abundance of the Chesapeake Bay Blue Crab is now definitely apparent. This increase is indicated from experiments conducted by the Virginia Fisheries Laboratory (detailed report from the director thereof being



A GOOD DAY'S WORK ON THE OYSTER ROCKS IN THE JAMES RIVER

herewith filed), the result of exhaustive investigations made by John C. Pearson, an unprejudiced investigator assigned to this work by the United States Fish and Wildlife Service, and information received from those engaged in the industry.

This increased supply of crabs is probably due to a number of factors, such as the setting aside of the Virginia crab sanctuary, containing approximately 400 square miles in the southern part of the Chesapeake Bay, closing the season for taking sponge crabs in that area; the reduction of the number of operating crabbers due to the draining off of men for war industries and the armed services; and the fact that crab packing plants are limited in capacity to handle the crabs, due to shortage of labor for reasons previously assigned.

In view of the satisfactory results obtained, we anticipate a continuance of the crab sanctuary in Virginia. The members of the industry have cooperated in a very fine way in the establishment of this sanctuary.

FISH

The reports of J. T. Meyer, Superintendent of Hatcheries, show satisfactory results from the three hatcheries operated by the Commission.

In spite of a reduction in fishing intensity due to prevailing wartime conditions, the fishing industry in general is in a satisfactory condition. Those who have been able to continue operations have enjoyed two seasons of real prosperity, to which they were entitled after so many lean years in the past. Reports from the Potomac River area indicate a greater abundance of rock fish than for several years. The same reports were received from the shad fishermen of the Bay.

POLLUTION

The menace of pollution has continued to grow. This is evidenced by the continued closing from time to time of various areas valuable for producing oysters and clams on account of the alleged damage to public health due to the dumping of refuse and sewage in the particular waters involved, especially in Hampton Roads. Condemnation of a certain amount of oyster and clam ground is to be expected during the present emergency on account of the rapidly expanding industrial and housing developments in the vicinity of Hampton Roads and Yorktown. It is thought, however, that the State and Government Health Services, the Hampton Roads Sanitation Commission, and other interested agencies, will ere long be able to combat effectively the evil of pollution and gradually reclaim and restore the valuable ground virtually lost for the time being to the seafood industry of Virginia.

ATLANTIC STATES MARINE FISHERIES COMMISSION

The Atlantic States Marine Fisheries Compact, authorized by Act of Congress, has been signed by twelve of the fifteen Atlantic Coastal States. Pursuant to Acts of Assembly 1942, Chapter 400, page 640, Virginia became a member of the compact as of July 1, 1942. The Virginia members of the Atlantic States Marine Fisheries Commission are William P. Hunt, of Hampton, Virginia, who is quite familiar with fishery problems; Honorable R. O. Norris, Jr., a member of the Virginia State Senate and one who has long been active in seafood matters and ever diligent in his efforts to improve the industry; and the Chairman of the Virginia Commission of Fisheries. Each member State is represented by three Commissioners. Meetings of the Commission are held from time to time, when called by the Executive Committee and in accordance with the By-laws of the Commission.

In order to save time and expense of travel, the Executive Committee established panels from each branch of the seafood industry consisting of the Commissioners from the various States interested in that particular problem. For example, there was set up a Chesapeake Bay panel consisting of the Virginia and

Maryland members of the Atlantic States Marine Fisheries Commission, and their technical advisers, to meet at least four times each year to consider matters of common interest, notably the Chesapeake Bay Blue Crab, the shad and striped bass, and the oyster situation in the Potomac River where the States of Maryland and Virginia exercise concurrent jurisdiction.

The results accomplished by the meetings of the Chesapeake Bay Panel alone have been of immense value to these two States and have served to develop a spirit of understanding and cooperation between those interested in the various seafood industries of the States of Maryland and Virginia, including the officials of seafood commissions of these States, that far exceeds any accomplishments of the pats in that direction. Already Maryland has passed a Statute giving its Department of Tidewater Fisheries similar discretionary power with respect to regulating the taking of crabs as has been held by Commission of Fisheries of Virginia for several years. Increasing practical results will undoubtedly continue to flow from these periodic meetings.

Further, the spirit of cooperation already developed between the member States of the Commission is most remarkable. An illustration of this fact is the passage by New York, Delaware and Pennsylvania of a crab conservation Statute similar to and modeled after the Virginia Statute. This is merely a single example of the evident desire and intent of the member States to cooperate with each other in a joint effort to bring about the maximum development of the fisheries in the waters of the States affected and with a minimum of friction in the accomplishment thereof.

We have no hesitancy in saying that the creation of the Atlantic States Marine Fisheries Commission and the development of panels or special committees under that Commission represent a development of the utmost importance to the member States and the seafood industry in general.

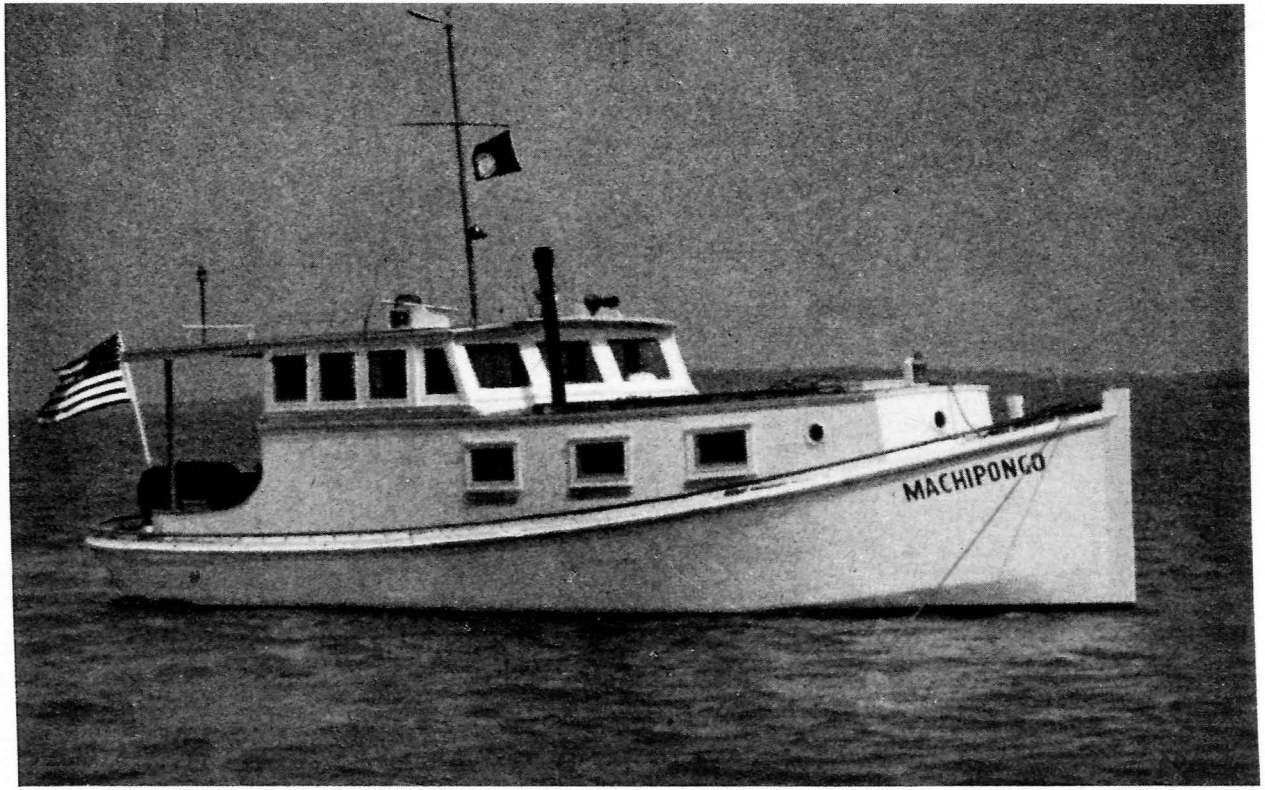
VIRGINIA FISHERIES LABORATORY

The Virginia Fisheries Laboratory is operated under the joint supervision of William and Mary College and the Commission of Fisheries, and its director is Dr. Curtis L. Newcombe, who has prepared and filed herewith a full report of the laboratory activities for the past two years. Hence, we will not enter into a detailed discussion here of the work of the laboratory.

We do affirm that the work done by Dr. Newcombe and his associates has been of inestimable value to the seafood industry, and has been along practical lines in fishery matters and education. An innovation during the past year has been the introduction of a mobile fishery exhibit carried to sixty-five different schools in twenty-five counties of Tidewater Virginia and shown to classes covering approximately 20,000 scholars. Further, many adults saw the exhibit, which was enlarged to include three reels of moving pictures on marine biology. We hope to eventually see an adequate course in marine biology established in all Tidewater high schools, in order that both students and their parents may be taught to appreciate the importance and value of the seafood industry to Virginia, which is approximately $5,000,000.00 in terms of the raw products landed.

We think action should be taken to create a unit at the laboratory for the collection of statistical data on the fisheries of the State. To initiate the system one statistical analyst will be needed with part time assistance from the present staffs of the laboratory and Commission of Fisheries. Such an analyst should be primarily charged with the collection and organization of data and prepare reports covering same. Types of forms to be used should be worked out with the persons involved. Including the salary of the statistical analyst, his travel and equipment, the expenses of this unit would not exceed $5,000.00 per annum. This amount should be made available through legislative appropriation.

The value of such catch statistics is readily apparent. Adequate catch records will show promptly increases or declines in production in time to offer remedial measures and will serve as an accurate basis for conservation regulations.



EASTERN SHORE CONSERVATION AND PATROL BOAT

LEGISLATION

We shall recommend to the coming session of the General Assembly certain changes in and amendments to the seafood laws. However, we believe existing legislation is largely adequate and the challenge is ours for a constructive administration of present Statutes for the improvement and restoration of Virginia's great seafood industry.

In conclusion we desire to pay tribute to each and every employee of the Commission for their careful attention to duty and the fine spirit of cooperation evidenced by them during the past two years. Further, we here testify to the valuable assistance received from various State agencies upon which we have called from time to time, including the Department of Health, the work of which is so closely related to our own. In addition, we desire to state that those engaged in the various branches of the seafood industry in Virginia have been always willing to offer assistance and help wherever possible. Too, our relations with the officials of Maryland and North Carolina and the United States Fish and Wildlife Service have been most pleasant and profitable.

Respectfully submitted,

Chas. B. Lankford, Jr.

G. J. Sayer

Charles E. Stuart,

R. G. Edwards.

Members, Virginia Commission of Fisheries.

TABLE No. 1

Receipts from Fish and Oyster Industry by Districts

For Year Ending June 30, 1942

DISTRICTS	Ground Rents	Oyster Licenses	Tax from Public Rocks	Tax from Leased Grounds	Tax for Carrying Out of State	Crab Licenses	Clam and Scallop Licenses	Fish Licenses	Fees	Fines	Miscel-laneous	Total
1	$ 383 13	$ 963 00	$ 1,266 89	$ 81 49	$ 3 50	$ 530 00	.....	$ 1,126 40	$ 97 50	$ 25 00	$ 50	$ 4,477 41
2	1,898 35	514 50	1 90	.....	3 80	414 00	.....	546 50	71 50	.....	4 25	3,454 80
4	1,643 78	474 00	302 08	479 44	.....	813 50	.....	4,301 50	47 00	.....	.....	8,061 30
5	604 49	294 00	.....	.....	.....	442 50	.....	1,038 00	32 50	.....	.....	2,411 49
6	2,399 39	1,460 50	1,947 43	105 33	.....	645 50	.....	360 50	99 50	.....	.....	7,018 15
7	1,738 61	354 50	22 71	446 40	.....	95 00	.....	445 20	37 50	.....	.....	3,139 92
8	3,565 60	249 00	.....	35 46	5 00	197 00	$ 134 50	203 00	57 00	.....	124 00	4,570 56
9	2,717 18	659 00	193 60	385 35	19 16	72 50	16 00	132 50	122 50	30 00	75 50	4,423 29
10	2,603 57	67 00	2 37	806 06	4 74	835 50	.....	563 00	46 00	.....	35 50	4,963 74
11	1,717 48	591 50	119 93	88 35	3 60	480 50	.....	254 00	100 50	20 00	185 50	3,561 36
12 and 14	1,223 72	1,708 00	1,161 31	76 92	10 50	397 00	.....	304 00	130 00	10 00	.....	5,021 45
15 and 16	5,093 11	256 00	6 00	31 90	.....	954 00	41 50	618 50	42 00	.....	52 00	7,095 01
17	4,154 41	155 50	.....	940 69	.....	481 50	114 00	491 00	35 00	.....	18 25	6,390 35
18	1,832 49	779 00	283 54	58 65	567 08	11 00	.....	300 00	352 50	30 00	.....	4,214 26
19	2,146 21	741 50	141 61	455 79	228 64	88 50	.....	427 80	408 00	135 00	32 25	4,805 30
19-A	.....	14 00	.....	.....	.....	.....	.....	1,381 40	.....	.....	.....	1,395 40
20	3,191 58	248 50	69 40	.....	68 80	5 50	.....	65 50	27 50	.....	.....	3,676 78
21 and 22	5,458 56	311 50	.....	6,848 08	.....	329 50	18 00	446 00	23 50	.....	11 75	13,446 89
24	4,532 27	34 50	.....	340 47	.....	660 50	72 00	430 00	13 00	.....	.....	6,082 74
25	3,825 48	859 00	355 83	1,668 36	.....	407 00	317 50	84 00	15 00	.....	.....	7,532 17
26	846 79	360 00	372 72	55 26	91 60	166 50	.....	304 50	77 00	.....	.....	2,274 37
28	5,292 49	461 00	35 57	1,852 70	71 14	375 50	721 00	52 00	54 50	.....	.....	8,915 90
29	3,027 26	628 50	202 51	432 32	3 60	199 50	42 50	81 50	15 00	.....	.....	4,623 69
*J. A. Anderton	.....	.....	.....	.....	.....	28 00	5 50	.....	11 00	10 00	.....	54 50
†J. F. Lewis	.....	136 50	949 99	.....	1,110 68	404 50	.....	.....	209 00	220 00	.....	3,030 67
‡W. C. Allen	.....	340 00	10 35	.....	20 70	868 50	.....	141 00	25 00	.....	.....	1,405 55
Office	.....	.....	.....	.....	.....	.....	.....	.....	.....	110 00	65 88	175 88
Totals	$59,895 95	$12,660 50	$ 7,445 74	$15,189 02	$ 2,212 54	$ 9,903 00	$ 1,482 50	$14,097 80	$2,149 50	$ 590 00	$ 605 38	$126,231 93

*Captain of Police Boat "Charmian".
†Captain of Police Boat "Katie".
‡Captain of Police Boat "Will F. Kellam'
Fines to Literary Fund.

TABLE No. 1—Continued

Receipts from Fish and Oyster Industry by Districts

For Year Ending June 30, 1943

DISTRICTS	Ground Rents	Oyster Licenses	Tax from Public Rocks	Tax from Leased Grounds	Tax from Carrying Out of State	Crab Licenses	Clam and Scallop Licenses	Fish Licenses	Fees	Fines	Miscellaneous	Total
1 and 2	$ 2,730 56	$ 1,409 00	$ 1,722 07	$ 821 52	$ 16 80	$ 979 00	.....	$ 1,928 10	$ 158 00	$ 225 00	.....	$ 9,990 05
4	1,689 54	526 00	297 49	677 49	.....	672 00	.....	2,240 50	50 50	.....	.....	6,153 52
5	623 11	147 00	.....	.....	.....	415 00	.....	773 50	17 00	.....	.....	1,975 61
6	2,484 33	1,305 50	909 77	2,715 65	.....	440 00	.....	908 00	90 00	10 00	.....	8,863 25
7	1,732 54	154 00	.....	606 45	.....	28 50	.....	406 30	14 50	.....	.....	2,942 29
8	4,081 23	214 00	.....	63 90	21 42	151 00	$ 62 50	280 00	44 00	.....	$ 319 19	5,237 24
9	2,986 35	510 50	100 84	325 12	50 08	86 00	13 00	133 00	115 50	.....	85 25	4,405 64
10	2,696 55	88 00	.....	796 15	233 00	439 00	20 50	748 50	40 00	.....	146 80	5,208 50
11	2,140 72	273 00	150 52	7 00	.....	327 00	.....	356 00	38 00	.....	13 00	3,305 24
12 and 14	1,273 48	1,455 50	917 74	170 49	26 82	372 00	.....	440 50	109 50	.....	31 00	4,797 03
15 and 16	5,303 16	267 00	.....	66 73	.....	773 00	11 00	827 00	38 50	.....	18 00	7,304 39
17	4,052 35	414 00	1,618 28	1,045 18	2,114 90	557 00	44 00	304 00	324 50	30 00	60 40	10,564 61
18	2,048 40	483 00	255 86	100 93	511 72	12 00	.....	372 50	166 50	20 00	.....	3,970 91
19	2,063 16	595 00	178 35	536 23	356 70	142 00	.....	449 40	332 50	120 00	28 75	4,802 09
19-A	.....	6 00	.....	.....	.....	.....	.....	1,976 10	.....	.....	.....	1,982 10
20	3,703 42	222 50	297 24	77 68	495 48	7 50	.....	87 50	38 00	.....	27 20	4,956 52
21 and 22	5,261 90	287 50	521 64	6,616 89	.....	218 50	.....	332 50	16 00	.....	10 50	13,265 43
24	4,521 59	119 50	15 00	223 60	.....	272 50	51 50	444 50	34 00	.....	.....	5,682 19
25	3,683 98	484 50	.....	1,463 51	.....	275 50	339 50	142 50	15 00	.....	.....	6,404 49
26	954 68	876 50	353 87	314 04	297 34	534 50	.....	326 20	117 00	110 00	63 75	3,947 88
28	5,164 20	439 50	46 86	1,609 06	93 72	136 00	722 50	45 50	15 00	.....	.....	8,272 34
29	2,419 25	345 50	85 72	335 59	48 88	173 50	39 00	46 50	16 00	.....	.....	3,509 94
*W. S. James	.....	.....	.....	.....	.....	172 50	.....	36 00	.....	.....	.....	208 50
†J. F. Lewis	.....	.....	.....	.....	.....	79 00	.....	.....	23 00	.....	.....	102 00
‡W. C. Allen	.....	42 00	22 85	.....	45 70	408 50	.....	136 50	9 50	.....	.....	665 05
Office	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,700 00	3,700 00
Totals	$61,614 50	$10,665 00	$ 7,494 10	$18,573 21	$ 4,312 56	$ 7,671 50	$ 1,303 50	$13,741 10	$1,822 50	$ 515 00	$4,503 84	$132,216 81

*Captain of Police Boat "Victor".
†Captain of Police Boat "Katie". Took over District 17 September 1, 1942 in addition to duties as Captain of "Katie.".
‡Captain of Police Boat "Will F. Kellam".
Fines to Literary Fund.

TABLE No. 2

General Fund

Receipts and Expenditures

	Year Ending June 30, 1942		Year Ending June 30, 1943	
Amount to the credit of the General Fund at the beginning of the year		$ 4,057 83		$ 4,025 00
Receipts:				
Ground rents	$ 59,895 95		$ 61,614 50	
Oyster tongers licenses	5,049 00		4,247 50	
Other oyster licenses	1,404 50		1,281 50	
20% oyster tax from public rocks	1,489 15		1,498 83	
20% oyster tax from leased grounds	3,037 78		3,714 63	
Tax on oysters carried out of State	2,212 54		4,312 56	
Crabbing licenses	9,903 00		7,671 50	
Clam and scallop licenses	1,482 50		1,303 50	
Food fish licenses	9,568 80		10,975 10	
Menhaden fish licenses	4,529 00		2,759 00	
Fees and permits	2,149 50		1,822 50	
Sale of "Sirene"	0		3,650 00	
Sale of old engine from "Willisett"	0		50 00	
Sale of 1935 Plymouth	50 00		0	
American Bank & Trust Co. Dividend Check	15 88		0	
Miscellaneous	539 50		803 84	
		$ 101,327 10		$ 105,704 96
Amount transferred from Repletion Fund		4,280 96		0
Total receipts		$ 109,665 89		$ 109,729 96
Expenditures—Administration:				
Salaries:				
Commissioner	$ 4,999 92		$ 4,999 92	
Other members of Commission	550 00		570 00	
Clerks and stenographers	7,522 34		6,100 00	
Bonus payroll	2,618 93		2,569 66	
Wages, extra office help, etc	64 80		83 33	
Counsel and expert services	1,282 50		1,100 00	
General repairs	165 65		10 05	
Motor vehicle repairs	127 51		28 94	
Light, heat, power and water	120 50		110 20	
Traveling	1,153 47		1,249 11	
Transportation	1 24		1 18	
Communication	900 73		599 07	
Printing	21 00		96 62	
Other expense	24 09		40 40	
Office Supplies	125 66		97 72	
Motor vehicle supplies	117 65		151 19	
Office equipment	0		10 80	
Motor vehicle equipment	915 00		15 63	
Other equipment	50		0	
Office equipment (capital outlay)	87 47		24 25	
Rent	1,087 50		996 50	
Insurance	148 07		129 86	
		$ 22,034 53		$ 18,984 43
Expenditures—Inspection and Policing:				
Salaries:				
Boat crews	13,848 50		12,227 50	
Inspectors and special police	35,322 50		34,907 33	
Civil Engineer	2,500 08		2,638 46	
Bonus payroll (charged to 01 for 1942)	0		1,987 08	
Wages	7,132 09		1,503 67	
Counsel and expert services	0		5 00	
General repairs	3 26		32 50	
Motor vehicle repairs	2,963 52		1,797 07	
Traveling	6,915 89		4,060 51	
Transportation	33 88		14 34	
Communication	589 84		397 66	
Printing (including license tags)	1,187 11		1,182 52	
Other expense	449 28		252 07	
Food supplies	821 57		737 41	
Fuel Supplies	143 37		139 11	
Office supplies	22 98		80	
Medical and laboratory supplies	0		13 10	
Laundry, cleaning and disinfecting supplies	42 16		23 42	
Refrigerating supplies	60 71		62 15	
Motor vehicle supplies	4,732 22		2,883 58	
Wearing apparel	0		7 25	

TABLE No. 2—CONTINUED

	Year Ending June 30, 1942		Year Ending June 30, 1943	
Other supplies	94 19		132 80	
Building materials	106 13		16 14	
Other materials	0		42 90	
Household equipment	12 90		38 32	
Motor vehicle equipment	607 21		218 82	
Other equipment	12 00		4 50	
Boats and nautical equipment	0		95 09	
Rent	1,936 40		1,721 46	
Insurance	4,015 07		2,610 01	
Motor vehicle equipment (capital outlay)	0		1,204 70	
Other equipment (capital outlay)	53 50		0	
		$ 83,606 36		$ 70,957 27
Amount transferred to Repletion Fund		0		1,662 03
Total expenditures		$ 105,640 89		$ 91,603 73
Balance in General Fund		$ 4,025 00		$ 18,126 23

TABLE No. 3

OYSTER REPLETION FUND

Receipts and Expenditures, Years Ending June 30, 1942 and 1943

	1942	1943
RECEIPTS		
Amount to credit of Repletion Fund at beginning of year	$ 40,110 30	$ 35,644 17
Receipts for:		
Tonging licenses—Ordinary and patent	6,207 00	5,136 00
80% tax on oysters from public rocks	5,956 59	5,995 27
80% tax on oysters from leased ground	12,151 24	14,858 58
Transferred from Special Fund	0	1,662 03
Total Receipts	$ 64,425 13	$ 63,296 05
EXPENDITURES		
Wages, tallying and planting shells	$ 6,040 82	$ 1,799 37
Special payments	0	8 78
General repairs	35	0
Motor vehicle repairs	11 35	0
Traveling	832 29	128 73
Transportation	3,579 75	44 00
Communication	18 09	1 20
Printing	2 94	3 83
Other expenses (purchase of shells, etc.)	11,325 92	6,696 34
Medical and laboratory supplies	50	0
Motor vehicle supplies	233 75	121 30
Building materials	2 89	0
Motor vehicle equipment	0	168 11
Other equipment	1 35	71 65
Boat and nautical equipment	0	32 44
Motor vehicle equipment (capital outlay)	564 00	0
Rent	1,636 00	792 00
Insurance	0	96 45
Boat and nautical equipment (capital outlay)	0	2,504 86
Total expenditures	$ 24,250 00	$ 12,469 06
Transferred to General Fund	4,280 96	0
Transferred to Virginia Fisheries Laboratory Fund	250 00	0
Total	$ 28,780 96	$ 12,469 06
Balance in Oyster Repletion Fund	$ 35,644 17	$ 50,826 99

TABLE No. 4

Recorded Planting Ground

Years Ending June 30, 1942, and June, 1943

DISTRICTS	1942 Number of Acres	1943 Number of Acres
1	507 86	507 86
2	2,029 55	2,029 50
4	1,647 03	1,650 56
5	612 71	616 91
6	2,375 72	2,360 37
7	1,738 06	1,725 52
8	5,638 58	7,020 29
9	2,652 77	3,031 88
10	3,218 48	3,650 50
11	1,948 11	1,939 84
12	149 96	154 72
14	1,053 66	1,109 08
15	4,110 38	4,228 17
16	2,693 60	2,674 60
17	3,876 65	4,028 54
18	1,795 90	1,775 37
19	2,058 22	2,036 05
20	3,352 88	3,406 66
21	7,014 50	6,288 98
22	2,289 44	2,110 38
24	4,422 42	4,505 24
25	3,823 64	3,700 97
26	870 49	913 44
28	5,412 83	5,103 52
29	2,539 66	2,356 01
Totals	67,833 10	68,924 96

TABLE No. 5

Table of Color and Age of Tongers Who Procured a License to Tong Oysters, Clams and Scallops

For Year Ending June 30, 1942

	AGES IN YEARS										
	20 or under	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	51 to 55	56 to 60	Over 60	Total
White	132	134	191	225	235	207	237	216	177	235	1,989
Colored	62	75	98	76	95	111	167	101	137	188	1,110
Totals	194	209	289	301	330	318	404	317	314	423	3,099

TABLE No. 5—CONTINUED

TABLE OF COLOR AND AGE OF TONGERS WHO PROCURED A LICENSE TO TONG OYSTERS, CLAMS, AND SCALLOPS

For Year Ending June 30, 1943

	AGES IN YEARS										
	20 or under	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	46 to 50	51 to 55	56 to 60	Over 60	Total
White	100	89	171	199	198	172	176	164	159	198	1,626
Colored	44	54	56	73	81	79	129	107	101	180	904
Totals	144	143	227	272	279	251	305	271	260	378	2,530

TABLE No. 6

COMPARATIVE STATEMENT OF EXPENSES BY YEARS

From 1942 to 1943, inclusive

	Office and Administration	Field Inspection	Total Expenses
Expenses, Oct. 1, 1923 to June 30, 1924*	$ 14,610 30	$ 43,493 62	$ 58,103 92
Expenses, July 1, 1924, to June 30, 1925	21,045 74	48,539 17	69,584 91
Expenses, July 1, 1925, to June 30, 1926	17,227 05	48,341 31	65,568 36
Expenses, July 1, 1926, to June 30, 1927	15,988 91	48,543 97	64,532 88
Expenses, July 1, 1927, to June 30, 1928	18,625 58	57,708 20	76,333 78
Expenses, July 1, 1928, to June 30, 1929	16,304 02	55,982 12	72,286 14
Expenses, July 1, 1929, to June 30, 1930	16,990 69	52,572 33	69,563 02
Expenses, July 1, 1930, to June 30, 1931†	†23,382 50	90,242 06	113,624 56
Expenses, July 1, 1931, to June 30 1932‡	‡21,057 67	86,300 06	107,357 73
Expenses, July 1, 1932, to June 30, 1933	21,114 27	79,100 03	100,214 30
Expenses, July 1, 1933, to June 30, 1934§	§17,565 07	68,227 49	85,792 56
Expenses, July 1, 1934, to June 30, 1935¶	¶29,247 96	86,636 60	115,884 56
Expenses, July 1, 1935, to June 30, 1936°	°22,733 34	96,572 91	119,306 25
Expenses, July 1, 1936 to June 30, 1937	20,120 38	91,345 77	111,466 15
Expenses, July 1, 1937, to June 30, 1938	21,107 13	97,059 01	118,166 14
Expenses, July 1, 1938, to June 30, 1939**	18,898 62	**103,528 15	122,426 77
Expenses, July 1, 1939, to June 30, 1940#	#20,686 77	90,824 14	111,510 91
Expenses, July 1, 1940, to June 30, 1941	19,503 21	88,343 40	107,846 61
Expenses, July 1, 1941, to June 30, 1942	22,034 53	83,606 36	105,640 89
Expenses, July 1, 1942, to June 30, 1943	18,984 43	70,957 27	89,941 70

*This period covers nine months only.
†The salary of the Commissioner was $7,500.00 during this period.
‡The salary of the Commissioner was $7,500.00 per annum during five months of this period.
§At this period there was a 30% cut in salaries in effect.
¶Vault constructed and bookkeeping machine purchased during this period.
°New boat built this year.
**New boat purchased this year.
#The salary of the Commissioner was reduced from $5,500.00 to $5,000.00 per annum.

EXHIBIT A

REPORT OF SUPERINTENDENT OF HATCHERIES

RICHMOND, VA., *July 2, 1942.*

HON. CHARLES M. LANKFORD, JR.,
Commissioner of Fisheries of Virginia,
Newport News, Virginia.

DEAR MR. LANKFORD:

I submit herewith my report covering the shad hatching work on the Chickahominy, Mattaponi and Pamunkey rivers for the 1942 season as follows:

The Chickahominy River Hatchery was in operation from April 27th to May 31st, inclusive, during which time two hundred and eleven (211) spawning roe shad were caught and stripped, from which we received a total of 3,860,000 eggs.

The Mattaponi River Hatchery was in operation from April 22nd to May 31st, inclusive, during which time forty-one (41) spawning roe shad were caught and stripped, from which we received a total of 1,410,000 eggs.

The Pamunkey River Hatchery was in operation from April 17th to May 31st, inclusive, during which time eighty-three (83) spawning roe shad were caught and stripped, from which we received a total of 3,180,000 eggs.

From the above total of 8,450,000 eggs we received a hatch of about 90 per cent of young shad, all of which were released in the rivers immediately after hatching.

During the 1941 season we collected a total of 8,601,000 eggs on the three rivers and this season's total is only 151,000 eggs less, which I think is very good due to the smaller number of fishermen this season over last. A large number of the younger fishermen are now either in the army, navy or defense work.

I received the full cooperation from all fishermen on the three rivers and they are all highly pleased with the results obtained from the work as the shad run is getting larger each season, which they contribute solely to the work we have been doing in the past few years. This season the early run was very large and which came at a time when prices were up.

Respectfully submitted,

J. T. MEYER,
Superintendent of Hatcheries.

EXHIBIT A

REPORT OF SUPERINTENDENT OF HATCHERIES

RICHMOND, VA., *August 5, 1943.*

HON. CHARLES M. LANKFORD, JR.,
Commissioner of Fisheries of Virginia,
Newport News, Virginia.

DEAR MR. LANKFORD:

I submit herewith my report covering the shad hatching work on the Chickahominy, Mattaponi and Pamunkey rivers for the season 1943, as follows:

The Chickahominy River Hatchery was in operation from April 28th to May 26th, inclusive, during which time one hundred and seventy-two (172) spawning roe shad were caught and stripped, from which we received a total of 4,758,000 eggs. Increase of 898,000 eggs over the total collected during the 1942 season.

The Mattaponi River Hatchery was in operation from April 19th to May 31st, inclusive, during which time seventy-three (73) spawning roe shad were caught and stripped, from which we received a total of 1,858,000 eggs. Increase of 448,000 eggs over the total collected during the 1942 season.

The Pamunkey River Hatchery was in operation from April 19th to May 31st, inclusive, during which time eighty-nine (89) spawning roe shad were caught and stripped, from which we received a total of 3,961,000 eggs. Increase of 781,000 eggs over the total collected during the 1942 season.

The total number of three hundred and thirty-four (334) roe shad caught and stripped during the 1943 season produced a total of 10,577,000 eggs. During the 1942 season three hundred and thirty-five (335) roe shad were caught, producing a total of 8,450,000 eggs. Total increase of eggs during the 1943 season over the 1942 season amounted to 2,127,000 eggs. The number of roe shad caught and stripped during the 1943 season was only one less than the number caught and stripped during the 1942 season, but those caught during the 1943 season gave up a much better percentage of eggs than those caught during the 1942 season.

From the above total of 10,577,000 eggs we received a hatch of about 85 to 90 per cent of young shad. All of which were immediately released in the rivers after hatching.

The run of shad was excellent this season and the market good and prices up and holding fairly well during the entire season, which gave the fisherman a chance to make a little money and come out on top.

All of the fishermen are highly pleased with the results of the hatchery work and the increase in the run of shad from year to year, which they did not enjoy before the work was started, and they are all sold one hundred per cent to carry on the work in the future, and I trust it will be the Commission's policy to carry on the work during the 1944 season.

Respectfully submitted,

J. T. MEYER,
Superintendent of Hatcheries.

EXHIBIT B

REPORT* OF THE VIRGINIA FISHERIES LABORATORY

To the
Honorable Charles M. Lankford, Jr.,
Commissioner of Fisheries of Virginia.

INTRODUCTION

The work of the Laboratory during the past two years has been directed along practical lines in the fields of fishery research and education. Needs arising from the national emergency have dictated certain departures from the work of the previous year. The research program has stressed studies of ways of increasing the production of oysters, ribbed mussels and blue crabs, and the assembling of information necessary for planning and carrying out a fishery program aimed toward the rehabilitation and conservation of the commercial fisheries of Chesapeake Bay. Analyses have been made of certain commercial practices followed in removing several fishery products and consequent recommendations offered to assure adequate conservation and future utilization of the fisheries.

The educational program has been expanded so as to include various kinds of assistance for most of the high schools of Tidewater. A limited amount of course work for teachers and others interested in fishery biology has been offered in Yorktown during the summer period.

Through the medium of lectures and written material, the importance of the Tidewater fisheries to the state has been explained and the advantages to be gained from a more efficient utilization of these seafood resources have been emphasized.

RESEARCH PROGRAM

Field and laboratory studies have been conducted on catfish, oysters, screw-borers, crabs, and ribbed mussels.

Catfish

The catfish fishery of Virginia is conducted principally on the James River and its tributaries, and the Potomac River. During the last two years, R. Winston Menzel has studied the composition of the commercial catches and the methods used in prosecuting the fishery. Records of individual fishermen for the period 1929-1942 have been analyzed in order to get an estimate of the intensity of the fishery in terms of number of fishermen, kind and amount of gear used, and annual yields.

There are three species of catfish taken in commercial quantities in the State—namely, the channel catfish; the white bullhead; and the yellow bullhead. The average size of the channel catfish taken now is slightly over one pound ranging upward to 15 inches in length. The white bullhead averages slightly under a pound (about 12 inches in length) and the yellow bullhead taken commercially weigh almost one-half pound, its average length being around 9 inches.

According to Federal reports for 1941, the production of catfish in Virginia was 496,000 pounds valued at $23,170. Study of catch records of individual James River fishermen clearly indicate that the actual quantity caught, during recent years, has been at least three times as great as official records indicate.

*The period covered by this report is July 1, 1941-June 30, 1943.

About half the yield in the State is from the James River area. Records obtained from individual fishermen showed that about 750,000 pounds valued around $45,000 were taken in the James River area alone during 1942.

Federal statistics indicate that the volume of catch in Virginia has been maintained at a level of around one-half million pounds during the past twelve years. However, the intensity of the fishery, at least in the James River, has greatly increased. Catch records of individual fishermen indicate that the amount of fishing gear used has probably trebled since 1929. It seems, therefore, that much more fishing effort, as measured by the amount of gear employed, is now required to catch roughly the same quantity of fish. In other words, fish are less abundant. This is also reflected in a decline in the average size of the commercial fish caught to an estimated one pound as compared with upward to one and one-half or possibly two pounds in former years.

Results of this study indicate: (1) that the commercial catch in the James River area is probably greater than the river can support without producing a decline in size and abundance during future years; and (2) that immediate steps should be taken to protect the fishery from universal exploitation. It is believed that the catch of channel catfish under 11 inches in length (tip of snout to tip of tail) and of bullheads under 9 inches long should be prohibited. Furthermore, catfish should be culled immediately after they are caught.

Oysters

Virginia's most valuable fishery resource is the oyster. Outside of Chesapeake Bay, there are no natural oyster grounds that approach ours in respect to size and potential productivity. Notwithstanding this fact, oyster production in Virginia had dropped over 60 per cent during the period 1912 to 1940—from about 43 million to 17.7 million pounds according to Federal statistics. The Baylor survey showed that the state has approximately 200,000 acres of public oyster rocks. In the proper development of this natural resource lies perhaps the greatest single source of increase in revenue to the state.

The general objective of the Laboratory's oyster work is (1), to provide a sound basis for replenishing depleted oyster rocks and (2), to show how shells may be utilized most economically for getting a high production of marketable oysters per acre of planted ground. The field studies are conducted by R. Winston Menzel, special attention being given to determining the oyster grounds best suited for developing seed areas and for fattening purposes, and the particular weeks during summer when shell plantings will yield the most productive results.

The three principal phases of the study investigated during the period covered by this report were: (1), periodic examination of experimental bags of shells put down at intervals throughout the growing season to indicate time, place, abundance and survival of oyster "spat"; (2), periodic examination of oysters to indicate their spawning conditions during the reproductive period; and (3), the relative resistance of different sized oysters to winter conditions since it is known that heavy mortality may take place during severe winters.

In the summer of 1941, "culch" (oyster shells) was planted at fortnightly intervals at Seaford on the York River and regularly examined for "spat" and amount of fowling of the shells by silt and numerous marine growths. The factors considered were: (1), amount of oyster larvae in the water from June to October; (2), the amount of "spat" that is present on old and clean shells during each fortnight of the season; and (3), the per cent of "strike", at various times during the summer, which survives until fall and also until the following spring. It was found that larval oysters struck in large numbers throughout the period July 1st to October 1st, highest numbers of "spat" ranging from 20 to 33 per shell having been obtained in July. However, despite the high catch of larval oysters during the early and middle parts of the summer the survival of these "spat" on November 7th was poor, averaging only about 1 per 10 shells. Experimental "culch" planted at Seaford on June 27th and July 10th and left down for two weeks averaged 1 and 12 "spat" per shell respectively. When left down

until November 7th, there was a survival of only one "spat" per 10 shells. "Culch" planted on August 7th averaged 10 "spat" per shell at the end of two weeks and 2 per shell by November 7th. These "spat" were small, indicating that they struck during late September or early October. The best results were obtained from plantings made on September 24th. These averaged 7 "spat" per shell on November 7th.

Poor survival of "spat" that has struck before the middle of August is at present attributed to the smothering of young oysters by silt and by competitors, including sponges, sea squits, bryozoans, hydrozoans, that are especially numerous during summer and noticeably less conspicuous toward the early fall period. Fouling of "culch" is, we believe, a serious factor to be reckoned with in Virginia on account of lowering the *survival* of young oysters as well as reducing the amount of "strike". Available records, while as yet incomplete, point to late summer and early fall as favorable periods for planting shells at least at Back Creek where these experiments were conducted.

These preliminary results are now being followed up with larger scale, commercial plantings by the Commission of Fisheries in the York and Rappahannock Rivers while experiments comparable to those of 1941 are being continued to provide a further check of these tentative conclusions. An important need of the Virginia oyster industry is an abundant and easily accessible source of seed oysters. An attempt is being made, therefore, to evaluate the oyster rocks near the upper reaches of the York and Rappahannock Rivers from a standpoint of their possible use to the state as seed-producing areas. Extension of seed areas in these waters will, it is believed, not only aid the local oysterman in these two great river basins but will relieve the strain on the James River seed grounds that constitute the backbone of Virginia's oyster industry.

Screwborers

In view of the widespread destruction of oysters in Virginia by screwborers (oyster drills) the Commission of Fisheries decided, in the spring of 1942, to investigate further the damage being done and to explore possibilities for practicing control measures similar to those demonstrated to be effective in Delaware Bay. Results of the field studies conducted on Hampton Bar by B. B. Shepherd and others are reviewed here. The more specific purposes of the field studies were: (1), to test out the efficiency of drill traps on bare and seed grounds; and (2), to demonstrate how traps should and should not be used and the best time for using them.

The drill traps used were made of chicken wire, each holding about one-half of a peck of seed oysters. The wire should be number 18 gauge, and double galvanized. Number 20 gauge wire was found to be unsatisfactory since it rusts out before the end of a season. Five-sixteenths of an inch, treated, marine rope is preferred for ground lines to which the traps are attached.

Fresh bait yielded the largest catches of drills. Barnacles and hooked mussels attached to James River seed attracted drills especially well but they only remained alive a week or two. The period traps are left down before examination should be about one week. As yet, there are not enough records to show the extent to which weekly catches are reduced by constant trapping of a particular piece of ground. It is significant that seed oysters as bait attract drills even when placed on planted ground. Although rebaiting the traps once during the summer has given good results, it is recommended that they be rebaited about once per month.

Observations made during this study support current reports that screwborers are destroying valuable oyster ground in Hampton Bar. Local estimates of losses on planted grounds in this area run as high as 40 or 50 per cent. Whatever number of drills may be present and that of course is unknown, there are enough to make trapping profitable to the oystermen.

Weekly catches provide a basis for adjusting the intensity of trapping operations. Using 40 traps per acre, the cost of trapping per summer (18 weeks) per acre is around 25 dollars.

From what is known of current losses on planted grounds, it seems clear that drill control will prove highly profitable to the oystermen. Trapping drills in the spring not only saves oysters from being destroyed by the drills taken, but also by the one or two hundred offspring that a single female may produce.

Additional work is needed to provide a more definite idea of the financial benefits to be gained from commercial trapping on different kinds of oyster ground. Also, there is need for a satisfactory method of clearing an oyster bar of drills in preparation for planting of seed.

Ribbed Mussels

Virginia's ribbed mussels have been used commercially since 1940 as a main source of vitamin D used in the manufacture of poultry food. Vitamin shortages arising from the war have given this particular source a special significance. To assure maintenance of the mussel beds and an adequate supply for the future, it became necessary to explore: (1), the effect of digging operations on the future productivity of the beds; (2), the available supply in Tidewater; and (3), ways, if any, by which the producing capacity of an acre of mussel bed may be increased and, if so, by how much.

Field studies on the life habits of the early developmental stages of the mussel and on its growth were undertaken by Dr. J. H. Lochhead and later continued by Dr. George M. Moore. Early in 1942, new experimental areas were selected at Carmine's Island in the York River and at Wachapreague, Virginia, where 80 acres of undisturbed marsh were leased. Here, a field station was established and a cultural program developed. Various types of culch that proved successful on an experimental scale include rope mops, cemented pine cones, corn cobs and corn stalks. During the 1943 season, semi-commercial experiments are in progress using certain of those items of "culch" that have been found to be best.

Culturing mussels through the use of clumps of small individuals as transplants has proven to have good possibilities. One obstacle to this cultural method lies in the predatory action of blue crabs. Proper imbedding of the transplants and selecting a favorable time for planting when crabs are inactive are aspects of the problem now receiving attention.

Growth studies of the mussel for a period of over two years indicate that it grows slowly, in comparison with the oyster, reaching a length of 3 inches in about 3 years, and 4 inches in from 6 to 8 years. In marshes of comparable level and softness, there is no significant variation in growth rate at various widely separate points throughout Tidewater.

The effect of digging on the subsequent condition of the "tump" has been considered. While commercial digging results in some damage to the "tumps", generally a core of smaller mussels remains. Also, there are numerous small patches and clumps of mussels left by the diggers. It appears likely, therefore, that digging operations will not permanently destroy the mussel population although it may reduce it to a point at which a number of years would be required for its recovery to normal productivity. A second point bearing on recovery of the mussel marshes to commercial proportions is the question of rate of natural propagation. "Strike" of mussel larvae during 1941 and 1942 in all the "tump" bearing marshes examined has not been heavy enough to suggest even a reasonably rapid recovery. But, the possibility that there are "heavy strike" years and that 1941 and 1942 were "lean" years must not be ruled out. Again, the slow rate of growth of the individual mussels and, too, the even slower rate of growth and recovery of a "tump formation" strongly suggest that cultural operations will soon be required if we are to maintain a currently large, stable fishery.

Blue Crabs

During the two years following 1939, production of soft crabs in Chesapeake Bay dropped from about 6 million to around 2.5 million pounds according to Federal statistics. The catch of hard crabs dropped from approximately 50 million pounds in 1939 to 27.7 million pounds in 1941. While the decline in Vir-

ginia was considerably less than in Maryland, it nevertheless represented a serious threat to the crab industry. The Virginia Commission of Fisheries acted promptly and in 1941, at the request of the Hampton Crab Packers Association, established a sanctuary, about 400 square miles in area, at the lower end of the Bay (figure 1). On the basis of numerous reports from widely separated parts of the Bay during the past year, it appears that the crab supply has significantly increased.

To help determine the value of the sanctuary for replenishing the crab supply, observations were made on the distribution and abundance of blue crab larvae in Virginia waters. Also, experiments were conducetd to show under what salinity and temperature conditions in Chesapeake Bay crab eggs would hatch out, develop and survive best.

Observations of Dr. S. H. Hopkins during the summer of 1941 indicated that by far the greatest number of blue crab *zoeae* collected in plankton tows in Virginia waters of the Bay came from the sanctuary (figure 1). Numbers as high as 3,300 were obtained in a single ten-minute surface tow. At nearby points up the Bay, such as Buckroe Beach and Mobjack Bay, very few of these larvae were found. Although "sponge" crabs are frequently observed in these waters of lower salt content—17 to 20 parts per thousand, predominance of dark "sponge" crabs in the sanctuary and orange colored "sponge" drabs in the less saline waters up the Bay seems to indicate a migration of "sponge" crabs to the sanctuary preparatory to hatching.

Environmental conditions in the sanctuary closely parallel those found to be within the optimum salinity and temperature ranges for embryonic and larval development. It is known that the average summer salinity and temperature ranges in the sanctuary are about 22 to 28 parts per thousand and 17 to 27° C., respectively, during the period from June to August (figure 1). These values closely correspond with the optimum conditions of early development described for the blue crab. In light of these findings it appears that Virginia, by establishing a sanctuary in the lower Bay, is making a major contribution to the maintenance of a high level of crab production for the future without seriously curtailing the overall output at the present time.

EDUCATIONAL PROGRAM

This program aims to develop a wider appreciation of the value of the tidewater fisheries and an understanding of how these resources may be managed so as to increase the income of the fishermen.

During the past two years fishery exhibits, moving pictures, and magazine articles were provided for the general public. Courses in fishery biology and conservation were offered to science teachers to prepare them for teaching their students about the marine life of local waters. In these courses, studies of the different commercial fisheries are stressed and particularly methods of fishing that may be expected to assure a permanent fishery.

The extension work of the Laboratory has centered in the high schools and consisted of various aids to the teachers and students as well as to some local organizations. This work was carried on by J. Revell Melson and B. B. Shepherd during 1941-42. Since February 1, 1942, it has been conducted by Hubert J. Davis. The materials used in this work include: (1), a mobile fishery demonstration unit; (2), a teaching unit on marine fisheries; (3), motion picture fishery films; and (4), mimeographed and printed matter on fishery biology. The fishery demonstration unit has been displayed for a period of from one to three days in about 65 schools located in twenty-five counties. The teachers and pupils of 712 classes comprising about 24,000 pupils have been given an opportunity to study the exhibit. It was exhibited before the Virginia Academy of Science and the Virginia Educational Association meeting at Roanoke and Richmond, respectively. Over 4,000 adults have seen the exhibit either at their local high school or at special showings for adult groups. Visitors to the exhibit in the Yorktown laboratory number over 2,000 during the two-year period.

The teaching unit on marine fisheries was provided to teachers so they could have specimen material for teaching fishery work. Thus far, over 100 units have

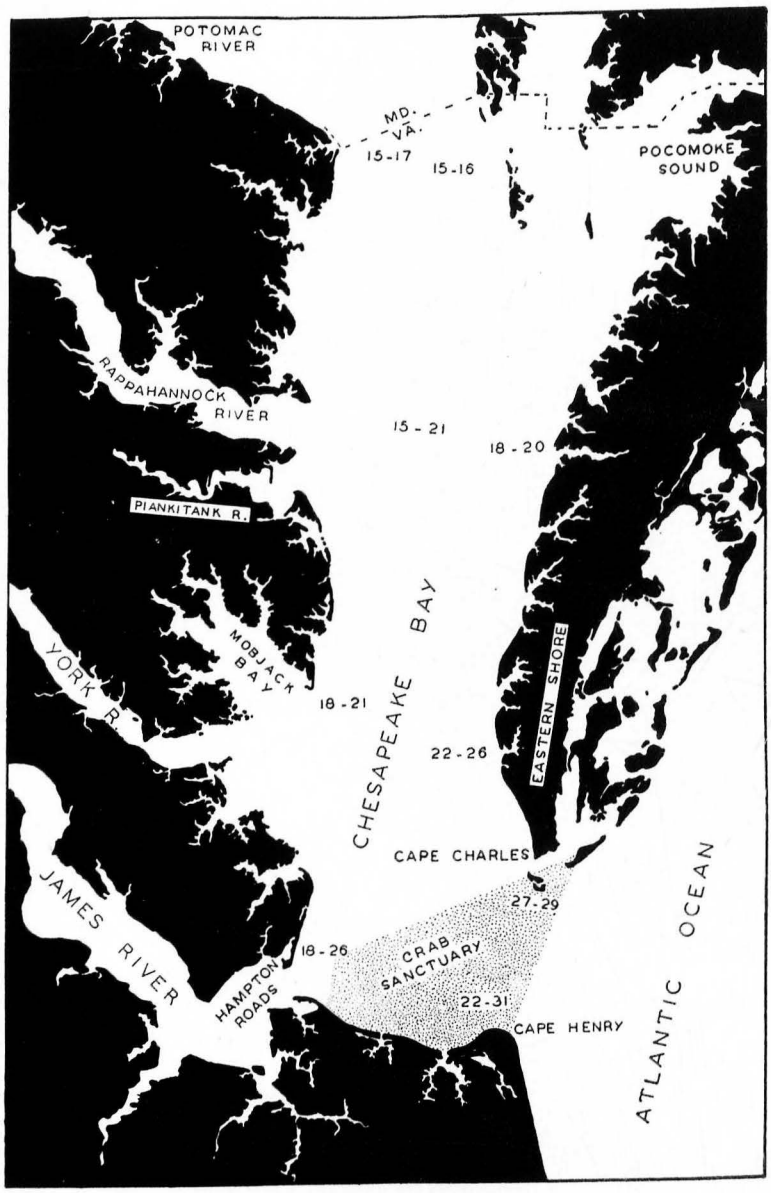


FIGURE 1

Showing the Location of the Virginia Crab Sanctuary (*drawn by G. M. Moore*). **Annual Average Surface-Bottom Salinity Records are Indicated** (*After Wells, Bailey and Henderson, 1929*).

FIGURE 2
A Laboratory Teaching Unit Issued to High Schools
(Photo by Virginia Chamber of Commerce)

been distributed (figure 2). There has been found to be a specific need for these units in th biology classrooms of most schools. Together with the descriptive material that accompanies them, the units make it possible for the teacher to develop lessons on the biology and conservation of the most important commercial marine animals in tidewater Virginia.

Three motion picture films, made available to schools and other organizations for educational purposes, illustrate the biology of the oyster and crab and various industrial activities of the commercial fisheries. Descriptive pamphlets, providing a source of information on the fisheries for the use of teachers, represent one of the most important needs of the schools. Several of these have been issued and others are being prepared. Also, progress has been made toward the preparation of a teacher's guide for use in the study of local marine animals.

The enthusiastic response from the schools to this extension program of fishery education is most encouraging. By providing training for science teachers, along with practical guides, descriptive materials and laboratory specimens for their use in the classroom, a new approach to fishery matters in Virginia may be expected to develop—one that will stimulate intelligent utilization and efficient management of the fisheries rather than shortsighted exploitation.

IV. ACKNOWLEDGMENTS

Acknowledgment is made to all the officials of the College and Commission of Fisheries who have given valuable assistance and cooperation. Special thanks are expressed to Dr. W. S. Calcott and to the E. I. duPont de Nemours and Company for cooperation and financial assistance that had made possible the development of the ribbed mussel investigations.

The writer is indebted to Mr. John C. Pearson for numerous collections of materials and for use of equipment; to Mr. Roy L. Robertson for providing several drawings; and to the Virginia Chamber of Commerce for various types of photographic work.

Curtis L. Newcombe

Director.

EXHIBIT C

REPORT OF SUPERINTENDENT OF INSPECTORS, POLICE, BOATS AND CONSERVATION

For Fiscal Years Ending June 30, 1942, and June 30, 1943

HONORABLE CHARLES M. LANKFORD, JR.,
Commissioner of Fisheries of Virginia,
Newport News, Virginia.

DEAR MR. LANKFORD:

The following is a report of the Superintendent of Inspectors, Police, Boats and Conservation for the fiscal years ending June 30, 1942, and June 30, 1943.

PATROL FLEET

Since my last report we have disposed of the patrol boat "SIRENE", in compliance with the Acts of the General Assembly 1940, which directed the Commission to dispose of that vessel.

At the present our patrol fleet is in fair condition, and every effort is being made to keep them in good running order. At this time it is very hard to get the necessary repairs made, and in many cases, the workmanship of such repairs is very inferior to what it would be in normal times, and much more expensive. I only hope that in the near future we may be able to renew our fleet with modern and better suited boats for our particular work.

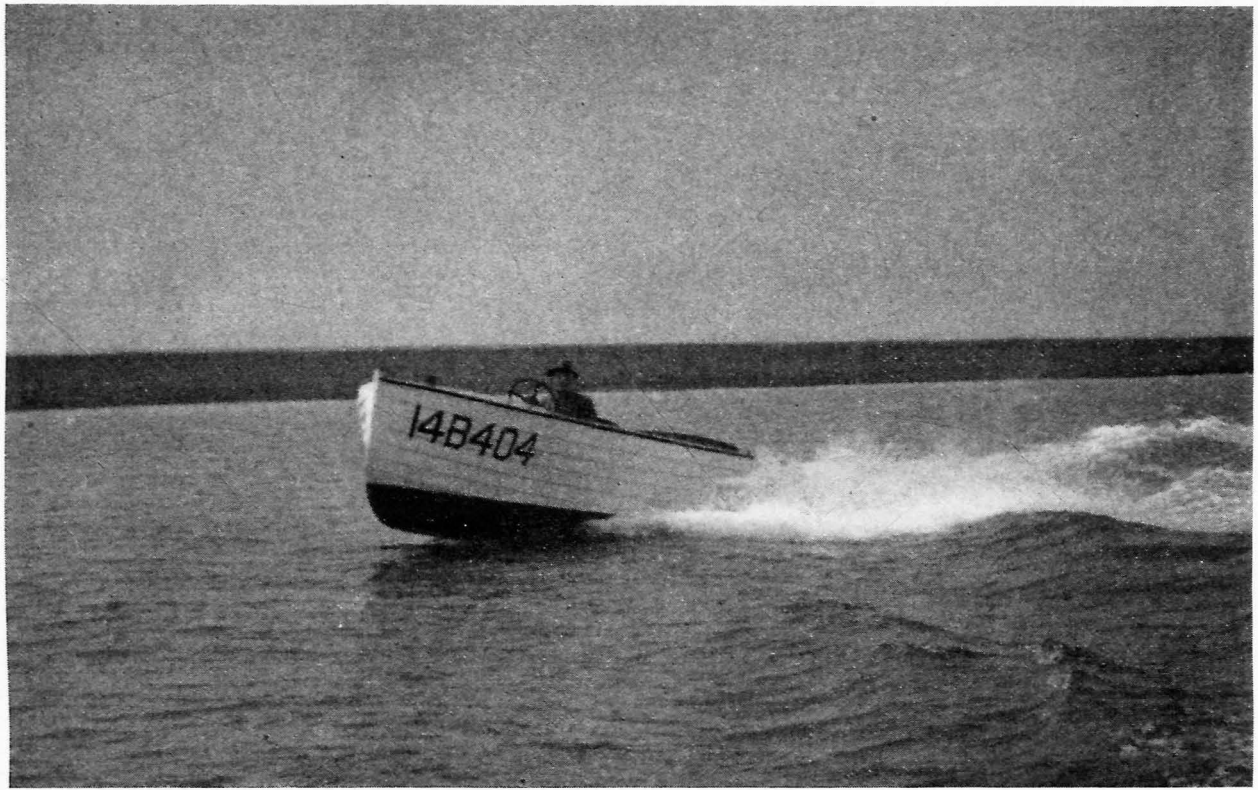
CONSERVATION

Attached is a full report on our repletion work for the past two years, and due to the shortage of manpower, I feel that we have accomplished fair results. Our work was curtailed a great deal in transplanting seed oysters in the past year, due to our inability to obtain tongers to remove these oysters. Our seed beds which we have built up by planting shells have shown an excellent catch, and I am very optimistic over the results which we expect to obtain from same. I am endeavoring to locate an oyster dredge boat that will have a capacity of between 700 and 1,000 bushels, to be used in our repletion work, and also to be of assistance to the Yorktown Laboratory in making special investigations of the oyster beds.

Our screwborer work has been confined solely to the seaside of the Eastern Shore, which is the only locality in the tidal waters of the State in which I feel we have obtained the best results possible, due to the labor conditions caused by our National Emergency.

SHAD HATCHING

I am still of the opinion that shad hatching, as is being conducted by our Superintendent, Mr. J. T. Meyer, is well worth our efforts and should be continued along the same lines. Considering the small amount of money we have expended, I think our results show that it is well worth the effort we have made, and it is the opinion of many of the old fishermen that we have done a work which is very beneficial to them.



EASTERN SHORE SEASIDE PATROL BOAT

CRABS

The crab sanctuary set aside for the protection of sponge crabs in the lower Chesapeake Bay has been made more beneficial than I even hoped for, and over a period of years I feel confident that the results obtained will be far greater than were expected when the Commission set this 400 square miles aside as a sanctuary.

The survey being conducted by John C. Pearson, of the U. S .Fish and Wildlife Service, has made all concerned feel very optimistic and has led me to believe that this sanctuary is the answer to bringing back our crab supply to normal.

FISH AND OYSTERS

The fish catch for the past two years has been very hard to gauge, and due to the increased government activities and restrictions placed in the Chesapeake Bay area it has been curtailed to some extent, but those fishermen who have been fortunate enough to obtain equipment and labor have shown a very good profit for their fishing efforts.

The oystermen have been very fortunate due to the increased price of and demand for oysters and have been well repaid for their efforts by receiving good pay for their day's work from the public rocks. In practically every locality the catch has been good, and the strike leads me to believe that for the next few years we will have a very good supply of oysters.

Respectfully submitted,

Superintendent of Inspectors, Police, Boats and Conservation.